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STATEMENT OF
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ENERGY AND MINERALS DIVISION
BEFORE THE
SUBCOMMITTEE ON ENERGY, NUCLEAR
PROLIFERATION AND GOVERNMENT PROCESSES,
SENATE COMMITTEE ON GOVERNMENTAL AFFAIRS

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to be here today to discuss the potential of alcohol fuels for automotive use. Over the past year we have done a substantial amount of work in the alcohol fuels area and have issued three reports on the subject. 1/ My remarks today will summarize the observations contained in these reports.

The primary conclusion resulting from our work is that alcohol fuels have vast potential for replacing petroleum fuels, particularly in the automotive sector. Moreover, unlike some other synthetic fuel options which still require extensive R&D before commercialization can be expected, the technology to produce alcohol fuels--both ethanol and methanol--is here today. Ethanol is now making a contribution toward stretching

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1/"Potential of Ethanol As A Motor Vehicle Fuel" (EMD-80-73, June 3, 1980); "Concerns Over the Department of Energy's (DOE's) Program and Organization for Developing and Promoting the Use of Alcohol Fuels" (EMD-80-88, July 22, 1980); "Conduct of DOE's Gasohol Study Group: Issues and Observations" (EMD-80-128, Sept. 30, 1980).

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available gasoline supplies, and methanol could eventually be produced in sufficient quantity to totally replace gasoline.

While my testimony deals largely with methanol because of its greater potential as an automotive fuel, let me make a few comments on ethanol.

--There is minimal but expanding use in a blend of 10-percent ethanol and 90-percent unleaded gasoline (commonly referred to as gasohol) which is now helping to stretch gasoline supplies.

--Because of feedstock constraints, ethanol's potential will most likely be limited to the role of a valuable gasoline extender, possibly in the form of a nationwide gasohol program.

--Ethanol commercialization has benefited substantially from a waiver of Federal gasoline taxes (amounting to a subsidy of 40 cents a gallon in the form of gasohol) and even larger waivers of some State gasoline taxes.

--While ethanol is more expensive than gasoline today, the cost differential should narrow in the future resulting in ethanol having a negligible impact on the fuel consumer when used in the form of gasohol.

--Ethanol production sufficient to enable a nationwide gasohol program would depend on the development of cellulose technology.

--Such a program could cut U.S. oil imports by 260 million barrels a year at a savings of billions of dollars.

With respect to methanol, we believe its potential as an automotive fuel is far greater than ethanol's. In discussing methanol, I will address its potential in terms of production, useability as an automotive fuel, and environmental and health characteristics, as well as point out some of the obstacles to its production and use.

METHANOL PRODUCTION

Methanol offers a synthetic fuel option with highly promising production potential that the Nation could begin implementing within existing technology. Methanol can be produced from almost any organic feedstock, including coal, natural gas, trees, and municipal solid waste. Hence, unlike ethanol, there is no shortage of available feedstocks to produce methanol. Methanol is currently produced in the United States primarily from natural gas. Because of limited availability of natural gas, production of methanol for automotive fuel use is expected to be from coal at least initially. In this connection, based on Department of the Interior assessments, sufficient economically recoverable coal reserves exist to enable enough methanol production to totally replace gasoline for perhaps 100 years while still enabling almost a doubling of current domestic demand for other uses. Methanol production potential could be further expanded with the use

of renewable feedstocks such as trees, municipal solid waste, and crop residues. Although the same feedstocks could be used to produce ethanol, considerably more methanol could be produced with those same feedstocks.

Although no commercial-size methanol from coal production plant currently operates in the United States, the technology to produce methanol has been commercial for years. Methanol was produced from coal in France in the late 1940s, and in the mid-1950s DuPont Chemical Company operated a methanol from coal plant in the United States. As cheap natural gas became available, coal was replaced as a feedstock. However, the production of methanol from coal received renewed interest after the 1973-1974 oil embargo and in 1974 the Federal Energy Administration (a predecessor agency to the Department of Energy) recognized methanol from coal technology as a near-term energy self-sufficiency option. Today, methanol can be produced with available technology using almost any quality coal. Even high sulfur coal, which presents problems for direct combustion, can be used because the sulfur is removed during methanol processing. Our work has concentrated on methanol production from coal. However, in a July 1980 report entitled "Energy from Biological Processes", the Office of Technology Assessment concluded that methanol can probably be produced from wood with existing technology. It further stated that production from crop residues and other renewable cellulose feedstocks needed to be demonstrated.

Production cost estimates are highly encouraging as well. While precise figures are not available since no commercial methanol from coal plant is in operation today, available projections suggest that methanol from coal could be produced at a cost competitive with gasoline. In our July 1980 report, we estimated this cost to be in the range of 50 cents a gallon. Cost estimates for production from wood are somewhat higher but still considerably below existing and projected ethanol costs. Thus, production capability at economically viable prices should not be an obstacle to a national scale methanol program.

USEABILITY AS AN AUTOMOTIVE FUEL

Methanol can be used as an automotive fuel within existing technology as well. Methanol can be used in small blending proportions in unmodified automobiles today, but problems with phase separation, vapor lock, and materials compatibility indicate that methanol could be optimally used in vehicles modified to take full advantage of its chemical properties. Major needed modifications involve increasing fuel flow and engine compression to adapt to methanol's lower energy content and high octane rating, and replacing various incompatible materials to adapt to methanol's corrosive properties. Finally, to overcome methanol's reduced cold starting capability, engineering modifications to the fuel intake system may be required unless the problem can be addressed by adding cold

starting aids such as ethers or, in fact, even gasoline to the methanol.

Auto industry representatives told us the vehicle modifications necessary would be achievable on the assembly line within existing technology at a cost of less than $200 per car. They also indicated vehicles optimized for methanol use could be available by the time the fuel is available on a widespread basis. Available performance test data on such engines is very encouraging. Testing on modified engines show significant increases in fuel efficiency. Thus, while methanol has only about one-half the energy content of gasoline, methanol optimized engines should yield significantly more than one-half as many miles per gallon. At today's costs for gasoline and projected costs for methanol, this efficiency gain could result in lower fuel costs per mile. Testing also has shown methanol to provide increased power and lower risk of vapor lock than existing gasoline engines.

ENVIRONMENTAL AND HEALTH CHARACTERISTICS

In terms of its environmental and health characteristics, straight methanol is also possibly superior to gasoline. Engine tests show straight methanol produces generally lower regulated exhaust emissions, especially nitrogen oxide. In addition, since methanol does not contain aromatic hydrocarbons (such as benzene) which are used in gasoline to boost octane, its evaporative and unburned fuel emissions are

probably less toxic and possibly pose less of a carcinogenic risk. Methanol combustion does result in increased unregulated aldehyde emissions but these emissions are thought to be easily controlled with catalytic converters.

In terms of protecting water quality, methanol is also possibly more environmentally benign. Unlike petroleum products, it is completely soluble in water and does not cause lasting damage to aquatic life in the event of a spill. From the standpoint of human health, methanol is probably less toxic to breathe and more toxic to drink. Steps, such as addition of an unpleasant smell to the fuel, will be necessary to prevent the fuel from being ingested as drinking alcohol.

OBSTACLES TO METHANOL PRODUCTION AND USE

While methanol has vast potential and many advantages relative to other options, our optimism about methanol as a fuel must be tempered with several realities. Neither methanol from coal nor vehicles optimized for its use are being domestically produced today. Further, no infrastructure exists for distributing methanol from its production source to points of sale. The problem of simultaneously developing the production capacity and converting both the auto and automotive fuel industries, together with the associated investment costs involved, will not be easily overcome. As a step toward solving this problem, however, it may be possible to provide a market for early methanol production by using the methanol as a gas turbine fuel for generating electricity.

Available testing shows methanol burns cleanly and efficiently in this capacity. Another early step might be the use of methanol in captive vehicle fleets, such as the Federal fleet, to provide a demonstration medium and early market for optimized methanol vehicles.

Another issue, common to other synthetic fuel options, is the question of environmental impacts resulting from greatly expanded coal production. If all the Nation's gasoline were to be replaced with methanol made from coal, coal production would have to more than double from its current level and much opposition to such increased mining exists. Plant siting could also pose problems. Further, the long-term effects on atmospheric carbon dioxide levels will have to be assessed. A balance of fuel needs versus environmental concerns will have to be struck before a nationwide methanol program can be expected.

COMMENTS ON PROPOSED REDUCTIONS IN ALCOHOL FUELS SUBSIDIES

As part of its overall program of budget cuts, the administration has proposed to terminate funding for feasibility studies, cooperative agreements, and loan guarantees for biomass-derived alcohol fuels projects administered by the Department of Energy. On March 3, 1981, the Comptroller General testified before the House Budget Committee on the administration's budget proposals. As part of that effort, we summarized and have made available to this Subcommittee,

our views on many of the energy proposals including the proposal affecting these additional alcohol fuels subsidies. A copy of our views is being provided for the record.

In those views, we stated that while GAO had not reviewed the effectiveness of the specific subsidies encompassed by the proposal, based on the results of our prior work we believe that an appropriate level of biomass-based alcohol fuels production could be achieved without these additional subsidies. The waiver of the Federal excise tax on gasoline already provides a subsidy of $16.80 a barrel and in 25 States this subsidy is supplemented by further State gasoline tax waivers. Moreover, excessive ethanol subsidies could result in an economically unjustified commitment of resources to ethanol, which has less potential than methanol. Reducing ethanol subsidies, accordingly, could serve to head off this potential problem.

Mr. Chairman, that concludes my prepared statement. We would be pleased to answer any questions at this time.